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THE HARVESTMAN GENUS *LIOPILIO* SCHENKEL (OPILIONES: PHALANGIIDAE)

James C. Cokendolpher

Department of Biological Sciences
Texas Tech University, Lubbock, Texas 79409

ABSTRACT

The harvestman genus *Liopilio* Schenkel is revised. Its relationship to other harvestmen is briefly discussed. The male of *Liopilio glaber* Schenkel is described and illustrated for the first time. *Liopilio yukon*, n. sp., is described from Alaska and the Yukon Territory.

INTRODUCTION

The original description (Schenkel 1951) of *Liopilio* is vague. Schenkel's description could easily serve for immatures of many of the known species of Phalangiidae. Cokendolpher (1980) noted the similarity of *Liopilio* to *Leptobunus* Banks, but did not state to which family these genera belonged. *Liopilio* and *Leptobunus* are members of the Phalangiidae and share several characters with *Mitopus* Thorell and *Tchapinius* Roewer. Following the classical system of Roewer (1923), *Leptobunus* and *Tchapinius* are members of the Leptobuninae (Leptobunidae of Rambla 1977, Starega 1978; and Leiobunidae of Šilhavý 1960), *Mitopus* is a member of the Oligolophinae (Phalangiidae), and *Liopilio* as described by Schenkel is a member of the Phalangiinae (Phalangiidae). Recent studies (in preparation) of the "Leptobuninae" reveal that this group is polyphyletic and that *Leptobunus* and *Tchapinius* are related to the "Oligolophinae." The single character used to separate the Oligolophinae from the Phalangiinae is the presence or absence of a ventral tooth on the basal segments of the chelicerae. *Mitopus*, *Leptobunus*, and *Tchapinius* have well developed teeth. In *Liopilio* the teeth not only vary in size due to age and sex of the specimen, but may be entirely lacking. Similarly, the Old World genus *Paroligolophus* Lohmander has one species, *P. agrestis* (Meade), which has a cheliceral tooth, and another species, *P. meadii* (Pickard-Cambridge), which lacks the structure. With such variability, it seems unsound to maintain the Oligolophinae separate from the Phalangiinae.

As *Liopilio* is inadequately described and as it has never been diagnosed or compared to other harvestmen genera, I now present a redescription of the genus and the single described species. In addition, a new species will be described.

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MATERIALS AND METHODS

Acronyms for collections from which specimens were examined are listed in the acknowledgments. Specimens in my personal collection are listed JCC.

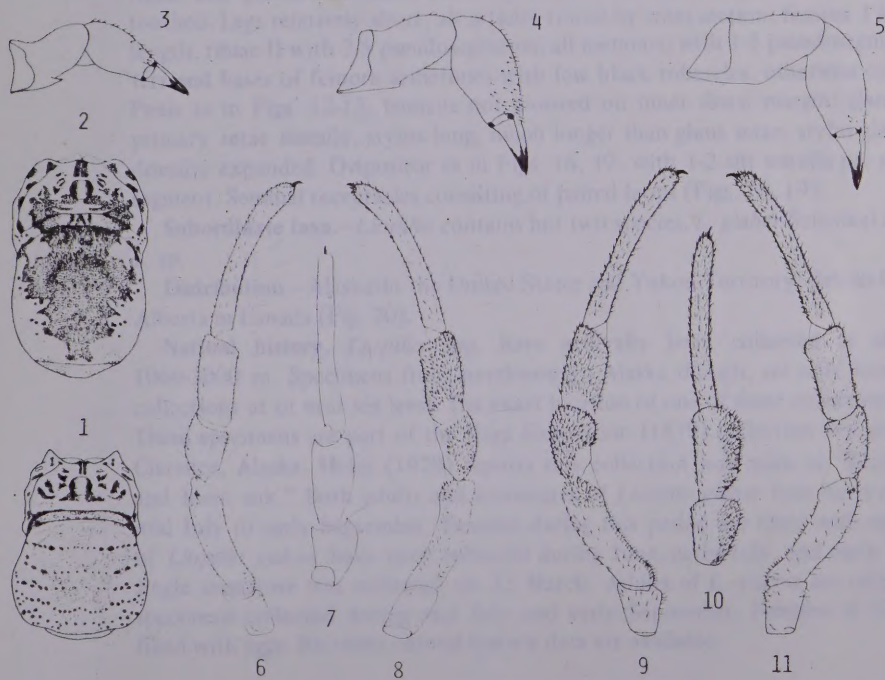
All anatomical measurements are in millimeters and were made using a binocular microscope equipped with an ocular micrometer as outlined by Cokendolpher (1981). Descriptions are based on all available specimens. Measurements were taken on all specimens, but due to the small sample sizes only the ranges are reported.

Genus *Liopilio* Schenkel

Liopilio Schenkel 1951:51; Forcart 1961:53; Cokendolpher 1980:134.

Type species.—*Liopilio glaber* Schenkel, by monotypy.

Diagnosis and comparisons.—*Liopilio* is similar to *Leptobunus*, *Mitopus*, and *Tchapi-nius*. The four genera differ from other phalangiid genera by lacking strong spines or tubercles on the preocular area, by having the supracheliceral lamellae smooth and short, palps without apophyses, and by generally having a tooth on the basal segment of the



Figs. 1-11.—Anatomy of *Liopilio*: 1, *L. glaber*, dorsal aspect of male body; 2, *L. yukon*, dorsal aspect of male body; 3, *L. yukon*, lateral aspect of immature chelicera; 4, *L. yukon*, lateral aspect of male chelicera; 5, *L. yukon*, lateral aspect of female chelicera; 6, *L. yukon*, lateral aspect of male palp; 7, *L. yukon*, ventral aspect of male palp (excluding femur) with setae removed; 8, *L. yukon*, medial aspect of male palp; 9, *L. yukon*, medial aspect of female palp; 10, *L. yukon*, dorsal aspect of female palp (excluding femur); 11, *L. yukon*, lateral aspect of female palp.

chelicerae. *Liopilio* and *Leptobunus* differ from *Mitopus* and *Tchapinius* by having the glans of the penis convex beneath, lack of large spines or tubercles anywhere on the body (except for coxae and bases of femora), and by having pseudosegments in tibiae II and all metatarsi. *Liopilio* differs from *Leptobunus* by having the palpal femora and patellae expanded distally and by having the male palpal tarsi toothed ventrally. The paired primary setae of the penis glans are located near the stylus junction; whereas in *Leptobunus* they are removed a considerable distance to about the midpoint of the glans. *Liopilio* is also unusual in the possession of yellow and green pigments on the dorsum of the abdomen.

Description.—Medium sized phalangids with soft, non-tuberculate bodies (Figs. 1, 2); dorsum and venter with only scattered setae. Ocular tubercle low, canaliculate, slightly wider than long, with scattered setae. Chelicerae not enlarged, with or without ventral tooth on basal joint; movable finger without apophysis (Figs. 3-5). Suprachelical lamellae short and smooth. Scent gland pores visible from above, elongate, length slightly less than diameter of eye. Palpi (Figs. 6-11) with inner distal margins of femora and patellae slightly expanded, covered only with setae; distal ends of femora with series of slit sensilla on dorsolateral margins, dorsomedial campaniform sensilla lacking; tarsi and sometimes tibiae and patellae of males with ventral rows of denticles, unarmed in females; claws toothed. Legs relatively short; all articles round in cross-section; femora I less than body length; tibiae II with 2-5 pseudosegments; all metatarsi with 1-5 pseudosegments; trochanters and bases of femora sometimes with few black tubercles, otherwise only with setae. Penis as in Figs. 12-15; truncus not grooved on inner distal margin; glans round with primary setae distally, stylus long, much longer than glans setae; stylus-glans membrane dorsally expanded. Ovipositor as in Figs. 16, 17, with 1-2 slit sensilla per side on second segment. Seminal receptacles consisting of paired loops (Figs. 18, 19).

Subordinate taxa.—*Liopilio* contains but two species, *L. glaber* Schenkel and *L. yukon*, n. sp.

Distribution.—Alaska in the United States and Yukon Territory, British Columbia, and Alberta in Canada (Fig. 20).

Natural history.—*Liopilio* spp. have generally been collected at altitudes from 1060-3000 m. Specimens from northwestern Alaska though, are only known from two collections at or near sea level. The exact location of one of these collections is uncertain. These specimens are part of the Vega Expedition (1879) collection and are labeled Port Clarence, Alaska. Holm (1970) reports this collection was made at "Grantley Harbour and Iman suk." Both adults and immatures of *Liopilio glaber* have been collected from mid July to early September. Females during this period are filled with eggs. Immatures of *Liopilio yukon* have been collected during June, early July, and early September. A single immature was collected on 22 March. Adults of *L. yukon* are only known from specimens collected during mid July and early September. Females at these times are filled with eggs. No other natural history data are available.

Liopilio glaber Schenkel

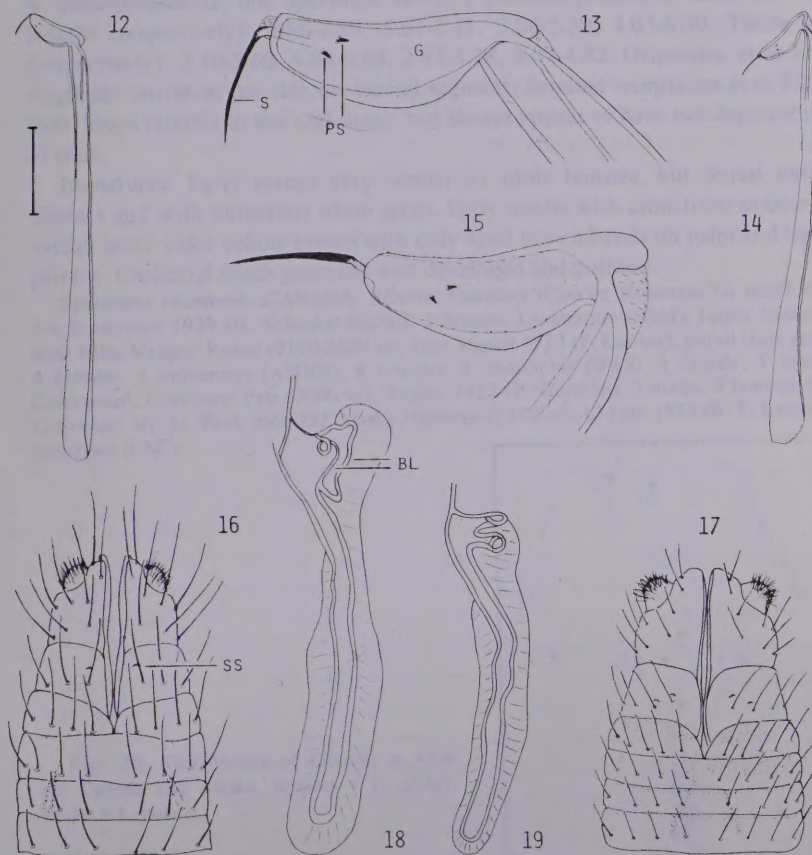
Figs. 1, 12, 13, 16, 18, 20

Liopilio glaber Schenkel 1951:51, fig. 48; Foreart 1961:53; Cokendolpher 1980:134.

Types.—Female lectotype and immature from Canmore (Casa'de Mountain ?), Banff National Park, Alberta, 3-4 September 1939 (H. Schenkel-Rudin), NMB no. 91-a, examined.

Distribution.—British Columbia and Alberta in Canada (Fig. 20).

Description.—Males: Total length 3.45-4.00, greatest width 2.20-2.60, maximum height 1.62-2.30; cephalothorax yellow brown with dark brown splotches; abdomen and posterior rim of cephalothorax light olive green to gray green; dorsum of abdomen with faint dorsal pattern of dark olive green, interrupted with rows of dark brown spots and few scattered white spots (Fig. 1). The green pigments of the abdomen appear to fade in alcohol to gray or light brown. Ocular tubercle length 0.35-0.38, width 0.40-0.45, height 0.17-0.20, distance from anterior edge of carapace 0.30-0.31; yellow brown rings around eyes. Coxae, genital operculum, and abdominal sternites light brown to yellow brown; sternites with lateral margins gray, sternite junctions with rows of dark spots. Chelicerae yellow brown with brown splotches laterally, teeth black, basal segments of each chelicera usually with a small tooth or ridge ventrally. Palpi light brown to yellow brown with dark brown stripes on dorsa of femora, patellae, and proximal $\frac{3}{4}$ of tibiae; distal tips of



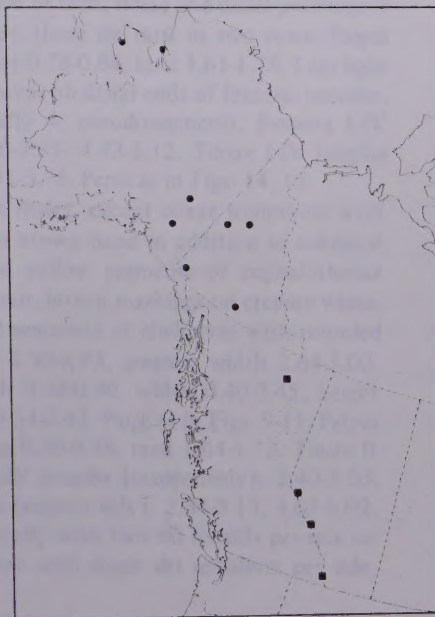
Figs. 12-19.—Genitalia of *Liopilio*: 12, *L. glaber*, penis; 13, *L. glaber*, distal end of penis; 14, *L. yukon*, penis; 15, *L. yukon*, distal end of penis; 16, *L. glaber*, ovipositor; 17, *L. yukon*, ovipositor; 18, *L. glaber*, seminal receptacle; 19, *L. yukon*, seminal receptacle. Scale lines for Figs. 12, 14 = 0.5 mm, 13, 15 = 0.09 mm, 16, 17 = 0.25 mm, 18, 19 = 0.05 mm; BL = basal lateral loops of seminal receptacle, G = penis glans, PS = paired primary setae of glans, S = penis stylus, SS = slit sensilla of second ovipositor segment.

tarsi dark brown; ventral surfaces of tarsi with many dark brown to black denticles arranged in two rows. Palpal lengths: femora 0.98-1.13, patellae 0.55-0.63, tibiae 0.75-0.80, tarsi 1.40-1.70. Legs yellow brown with dark brown bands preceded by yellow brown on distal ends of femora I, III, IV; femora II, patellae, and tibiae often with subdistal bands of dark brown; tibiae II with 3, rarely 4, pseudosegments. Femora I-IV lengths (respectively): 3.00-3.43, 6.60-6.93, 3.50-3.87, 4.40-4.69. Tibiae I-IV lengths (respectively): 2.80-3.20, 6.09-6.43, 3.00-3.01, 3.23-3.38. Penis as in Figs. 12, 13.

Females: Form and coloration essentially as in males, except dorsum of abdomen with more green coloration, bases of coxae splotted with brown. Basal segments of chelicerae at most with rounded lobes beneath. Total length 5.31-6.58, greatest width 3.75-4.63, maximum height 2.63-3.40. Ocular tubercle length 0.38-0.43, width 0.42-0.50, height 0.18-0.24, distance from anterior edge of carapace 0.28-0.38. Palpal lengths: femora 0.99-1.39, patellae 0.52-0.80, tibiae 0.79-0.91, tarsi 1.40-1.97. Tibiae II with 2-4, usually 4, pseudosegments; one specimen has 0, 1 pseudosegments in tibiae IV. Femora I-IV lengths (respectively): 2.86-3.59, 5.61-7.11, 3.00-5.20, 4.03-6.00. Tibiae I-IV lengths (respectively): 2.40-3.60, 4.88-6.84, 2.43-3.28, 3.07-4.82. Ovipositor as in Fig. 16; with single slit sensillum per side on second segment. Seminal receptacles as in Fig. 18; lateral basal loops variable in size and shape, but always appear to have two separate tubes joined at ends.

Immatures: Later instars very similar to adult females, but dorsal pattern not as distinct and with numerous white spots. Early instars with same form as later instars, but overall body color yellow brown with only faint brown bands on palpi and legs, no dorsal pattern. Cheliceral tooth generally well developed and pointed.

Specimens examined.—CANADA, *Alberta*: Canmore (Casa'de Mountain ?), Banff National Park, 3-4 September 1939 (H. Schenkel-Rudin), 1 female, 1 immature (NBM); Jasper National Park, The Bald Hills, Maligne Range (2100-2600 m), July-August 1970 (P. Kuchar), pitfall traps near timberline, 4 females, 4 immatures (AMNH), 4 females, 4 immatures (WAS), 1 female, 1 immature (JCC); Castleguard, Crowsnest Pass (3000 m), August 1972 (R. Harmon), 3 males, 3 females (CNC). *British Columbia*: Mt. St. Paul, mile 392 Alaska Highway (1370 m), 17 July 1959 (R. E. Leech), 1 female, 1 immature (CNC).



Figs. 20.—Distribution of *Liopilio* in western Canada and Alaska, squares = *L. glaber*, circles = *L. yukon*.

Liopilio yukon, new species

Figs. 2-11, 14, 15, 17, 19, 20

Liopilio, n. sp.: Cokendolpher 1980:134.

Types.—Male holotype from Isobel Pass (1370 m), mile 206 Richardson Highway, Alaska, 18 July 1962 (R. E. Leech), CNC; and 55 paratypes (listed under specimens examined).

Etymology.—The specific epithet is a noun in apposition.

Comparisons.—*Liopilio yukon* is similar to *L. glaber*, but differs by being slightly larger and by having the dorsal abdominal pattern distinct, dorsal pattern obscured or entirely absent in *L. glaber*. In addition, *L. yukon* has the last abdominal sternite noticeably indented posteriorly, whereas in *L. glaber* this sternite is straight or only slightly indented. The male palpal patellae and tibiae of *L. yukon* are generally armed ventrally with small denticles (Fig. 7), bare in *L. glaber*. The second segment of the ovipositor has one slit sensillum per side in *L. glaber*, whereas in *L. yukon* there are generally two.

Distribution.—Alaska in the United States and Yukon Territory in Canada (Fig. 20).

Description.—Males: Total length 4.21-5.00, greatest width 2.44-2.83, maximum height 1.87-2.97; cephalothorax creamy yellow with velvety dark brown splotches; abdomen creamy yellow to bright yellow with distinct dorsal pattern of velvety dark brown (Fig. 2). The yellow pigments of the dorsum appear to fade in alcohol to an off white to very light yellow. Ocular tubercle length 0.37-0.40, width 0.41-0.43, height 0.18-0.21, distance from anterior edge of carapace 0.40-0.50; dark brown with black rings around eyes. Genital operculum light brown. Abdominal sternites creamy white, junctions with rows of few brown to black spots. Chelicerae light brown with darker brown splotches laterally, teeth black, basal segments usually with a small ridge or tooth ventrally (Fig. 4). Palpi (Figs. 6-8) light brown with dark brown stripes on dorsa of femora, patellae, and proximal 2/3 tibiae; dark brown spots in two rows on lateral margins of patellae and tibiae; distal tip of tarsi dark brown; ventral surface of tarsi, tibiae and distal portions of patellae with many dark brown to black denticles, those on tarsi in two rows. Palpal lengths: femora 1.02-1.20, patellae 0.68-0.72, tibiae 0.78-0.84, tarsi 1.61-1.78. Legs light brown with dark brown bands preceded by light areas on distal ends of femora, patellae, and sometimes tibiae; tibiae II with 2-5, generally 4, pseudosegments. Femora I-IV lengths (respectively): 3.08-3.40, 6.00-6.40, 3.20-3.85, 4.73-5.12. Tibiae I-IV lengths (respectively): 2.80-3.20, 5.47-6.00, 2.94-3.00, 3.41-3.78. Penis as in Figs. 14, 15.

Females: Form and coloration essentially as in males, except coxae sometimes with distal band of dark brown and tibiae with median brown band in addition to subdistal band; abdomen white with brown markings. The yellow pigments of cephalothorax appear to fade in alcohol, but a distinct dorsal pattern, brown markings on creamy white, is visible on a specimen over 100 years old. Basal segments of chelicerae with rounded lobes or smooth ventrally (Fig. 6). Total length 5.90-6.83, greatest width 2.64-5.00, maximum height 2.85-4.07. Ocular tubercle length 0.38-0.40, width 0.40-0.45, height 0.20-0.22, distance from anterior edge of carapace 0.34-0.43. Palpi as in Figs. 9-11. Palpal lengths: femora 0.99-1.18, patellae 0.63-0.78, tibiae 0.80-0.88, tarsi 1.64-1.73. Tibiae II with 2-5, generally 3, pseudosegments. Femora I-IV lengths (respectively): 2.40-3.50, 4.23-6.90, 2.37-3.79, 3.70-5.42. Tibiae I-IV lengths (respectively): 2.34-3.13, 4.03-6.02, 2.19-2.91, 2.38-4.00. Ovipositor as in Fig. 17, generally with two slit sensilla per side on second segment, single specimen from Port Clarence with single slit sensillum per side.

Seminal receptacles as in Fig. 19; lateral basal loops variable in size and shape, but always appear to consist of single tube.

Immatures: Later instars very similar to adult females, except dorsum gray to gray brown with dark brown pattern; abdominal pattern with several white to gray splotches. Early instars as later instars, except leg bands are indistinct, often only with splotches of brown. Cheliceral tooth pointed (Fig. 3).

Specimens examined.—Male holotype and 55 paratypes. UNITED STATES, *Alaska*: Kotzebue (= Katzebue), 9 September 1959 (A. B. Krom), 1 male, 1 female, 32 immatures (AMNH), Port Clarence, Grantley Harbour (Iman suk, 65°15'N, 166°20'W), 23-26 July 1879 (no. 1051. Vega Expedition), 1 female, 2 immatures (NHR); Isobel Pass, mile 206 Richardson Highway (1370 m), 17 July 1962 (R. E. Leech), 2 immatures (CNC), 13 July 1962 (P. J. Skitsko), 1 male (JCC), 18 July 1962 (R. E. Leech), 2 males, 1 female (CNC); Dadina River drainage, sec. 28, SW quar. (62°01'N, 144°30'W - 1150 m), alder thicket, 22 July 1978 (R. Saltmarch), 1 male (AMNH). CANADA, *Yukon Territory*: Kluane National Park, Grizzly Creek (61°05'N, 139°06'W - 1890 m), 27 July 1976 (D. Cossette), 1 female (CNC); North Fork Pass, Ogilvie Mountains (62°21'N, 138°15'W - 1060 m), 18 June 1962 (R. E. Leech), 1 immature (CNC); Swede Dome, 55 km W Dawson (1150 m), 5 June 1962 (R. E. Leech), 5 immatures (CNC), (1150 m), 5 June 1962 (P. J. Skitsko), 4 immatures (CNC), (1190 m), 2 June 1962 (R. E. Leech), 2 immatures (CNC); mile 11 Canol Road (1370 m), 22 March 1962 (R. E. Leech), 1 immature (JCC).

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